Salt Lake City, Utah

January 31, 1939.

Mr. T. H. Humpherys,
Utah State Engineer
B u i l d i n g.

Dear Sir:

In accordance with your verbal instructions of August 1938, I rated the small pumps on Lower Bear river and assembled all available data as to use of water during the irrigation season of 1938 within the Lower Bear River distributing system.

The work of getting field information and the assembling of the data in the report was done during the time I was employed by the State Engineer's office and paid from State funds. I herewith submit a report of same.

Yours very truly,

L. C. Monson

L. C. Monson

LCM/9

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REPORT OF USE OF WATER IN LOWER BEAR RIVER SYSTEM

1938

BY L. C. MONSON

INTRODUCTION

A meeting of a majority of the Lower Bear River water users (Utah), called by the State Engineer in compliance with Section 100-5-1, Revised Statutes of Utah, 1933, and laws amendatory thereto, was held in the Assembly Room of the Chamber of Commerce, Logan, Utah, June 27, 1938, for the purpose of hearing a report of last year's work and financial statement and making recommendations for a Water Commissioner, the duties he shall perform, and the compensation he shall receive. The motion was made and duly passed that a committee be appointed to prepare a budget and make recommendations to the State Engineer for the appointment of a Water Commissioner, whose duty it would be to distribute the water for the season of 1938 and to render a report of such work. This committee consisted of Douglas Scally, a representative of the Utah-Idaho Sugar Company; Saul E. Hyer, representing the Cub River Irrigation Company; and W. H. Thain, representing the small pumps.

An effort was made to obtain the services of a capable engineer, but one could not be found who would accept the position at the compensation made available by the budget; consequently, no Commissioner was appointed.

In order that the continuity of the valuable record of the use of water might be preserved, the State Engineer assigned the author, a hydrographer from the office of the State Engineer, to rate the small pumps and compile all available data relating to the distribution and use of water in 1938.

During the latter part of August and the first part of September, therefore, the author, by means of a current meter, rated the small pumps then operating on the river and computed the ratio of output in acre-feet to input in kilowatt hours and also the amount of water pumped. For those pumps not then operating, the 1937 ratings were applied. The kilowatt hours used were supplied by the Utah Power and Light Company. The owner of each pump, the meter number, and the number of kilowatt hours consumed by each during the period from May to October, inclusive, are given in Tables I and II, respectively, for the 1937 and 1938 seasons. The entire system was inspected and observations made of the beneficial use of water and other related conditions.

The author is indebted to E. J. Baird, Water Commissioner, District #5, Idaho; the engineering staff of the Utah Power and Light Company; A. B. Purton, District Engineer, United States Geological Survey; and to the authors of former Water Commissioners' reports for the valuable data obtained therefrom and used in the preparation of this report.

UPPER BEAR RIVER

Bear river rises in Summit county, Utah among the lofty peaks on the northern slopes of the Uintah mountains. Distributed throughout these peaks, which range in elevation from 9,000 to 13,000 feet above sea level, are many small glacial lakes and basins that serve as excellent basins for collecting precipitation, the greater part of which falls in the form of snow. This precipitation, together with numerous small springs, forms the direct source of supply for the main fork of Bear river.

From Utah the river's course extends down the northern slopes of the Uintah mountains to Evanston Valley, Uinta county, Wyoming. Leaving Evanston Valley through narrow rocky gorges it emerges into the Upper Bear River Valley in Rich county, Utah, in which are located the towns of Woodruff and Randolph. The river then again enters Wyoming and extends northeasterly several miles north of Cokeville, Lincoln county, Wyoming. Having traversed this extended valley the river cuts through the Preuss range and enters Bear Lake Valley near Dingle, Bear Lake county, Idaho in the south end of which we find Bear lake. This lake has an area of approximately 140 square miles. Although it is situated several miles south of the natural channel of the river, its proximity has had the effect of dividing the river naturally into what has become commonly known as the "Upper Bear river" and the "Lower Bear river."

LOWER BEAR RIVER

Lower bear river has its beginning near Dingle, Idaho. Leaving Bear Lake Valley at the north end, the river flows northwesterly through hilly and broken lands. Near Soda Springs, Idaho it passes through a deep narrow channel, detours the north end of the Bear River range, and flows almost due south into Gentile Valley, Bannock county, Idaho. From this valley the river falls rapidly through what is known as Oneida narrows. After passing through the narrows the river enters Cache Valley and continues south, entering Cache county, Utah at a point approximately 2½ miles south of Weston, Idaho. It then traverses the west side of Cache Valley, entering into a deeply eroded channel below Cache Junction to flow westerly through the Wellsville mountains and into Box Elder county, Utah. From this point the river continues in a southerly direction along the east side of the valley into Bear River bay, and finally discharges into Great Salt lake.

DISTRICT

That portion of the Lower Bear river extending from the river bridge near Weston, Idaho to and including the Utah-Idaho Sugar Company's East and West canals, Box Elder county, comprises the district considered in this report. Though several streams are tributary to Bear river in Cache county, most of the water is diverted by owners of decreed rights before it reaches the river; thus, only the river proper is included in this district.

The name, kind, and nature of diversion dams, head gates, and measuring devices for the entire district are given in Table III.

The increase in the flow of water in Bear river between the Weston bridge (Idaho) and the head of the East and West Side canals at Cutler dam is given in Table IV. From this table it will be observed that the maximum increase was during the month of May (135,661 ac. ft.) and the minimum during the month of September (24,661 ac. ft.).

Mr. B. L. Mendenhall, Water Commissioner for 1937, reported a total irrigated area of 70,397 acres for 1937, of which 52,000 acres were in Box Elder county; 16,397 acres in Cache county, Utah; and 2,000 acres in Franklin county, Idaho. Having no information as to changes in the area irrigated, the same areas are assumed as being irrigated during 1938. The distribution of this irrigated area by diversion is given in Table V. The location of the irrigated area in the system is shown in Figure II.

GAUGING STATIONS

Gauging stations are maintained on that portion of the Lower Bear river within this district at the Weston bridge and below the Cutler reservoir. These two stations are maintained co-operatively by the Water Commissioner of Idaho District #5, U. S. Geological Survey, Utah State Engineer, and Utah Power and Light Company. There are also gauging stations maintained co-operatively by the U. S. Geological Survey, Utah State Engineer, and Utah Power and Light Company on the two Utah-Idaho Sugar Company canals diverting below Cutler reservoir. Water-stage recorders at each of these stations, together with frequent current-meter measurements, make for very good discharge records. The discharge records made in the district for 1938 are shown in Tables VI to X, inclusive. These records are on file in the office of the U. S. Geological Survey, Salt Lake City, Utah and will be published in the 1938 U. S. Geological Survey's water-supply papers. The location of each gauging station is shown in Figure III.

BEAR LAKE STORAGE

Bear lake, divided about equally in Rich county, Utah, and Bear

Lake county, Idaho, has been developed as a storage reservoir by the Utah Power and Light Company, which owns and controls the storage rights and all appurtenant works.

The flood waters in Bear river are diverted to the lake through the Rainbow Inlet canal. Originally the Dingle Inlet canal was the only means of making this diversion. Later the Rainbow Inlet canal was constructed and for a time both were in use; at present, however, only the Rainbow canal is being operated.

The storage thus made is released, as required, for irrigation and power purposes through an outlet canal. The water stored above elevation 5,920 is released by gravity, while that below this elevation is pumped into Mud lake by the Lifton pumping plant, having a capacity of 1,500 second-feet under a 13-foot lift, thence by gravity through the outlet canal. The area and capacity of Bear and Mud lakes are given in Table XIII.

Assuming an elevation of 5,902 as the minimum elevation to which the lake may be pumped, the storage available on April 1, 1938 was 589,000 acre-feet, of which 505,300 acre-feet was held over from 1937. The holdover as of January 1, 1939 was 707,400 acre-feet. The increase in lake elevation from January 1, 1938 to January 1, 1939 was 2.7 feet. The drawdown, including evaporation losses during the season to January 1, 1939, amounted to 127,100 acre-feet, as shown by the graph of lake elevations for 1932-1938, Figure I, and by Table XI, which shows the lake elevations on the first day of each month.

CUTLER RESERVOIR

The Cutler dam and power plant are located in Sec. 27, T. 13 N., R. 2 W., in a narrow gorge of Wellsville mountains near Wheelon. The reservoir has an available storage capacity of 17,063 acre-feet; the amount of usable storage may be influenced by the fact that the reservoir is used principally for equalizing purposes and as a forebay for the Cutler power plant. Daily elevations of the reservoir are shown in Table XII, while the area and capacity are shown in Table XIII along with those of Bear lake and Mud lake.

PRECIPITATION

Assuming that precipitation over this distributing system during the irrigation season would be fairly well indicated by the amount of precipitation at the Logan Weather Bureau station, the following table indicates the amount of precipitation for 1937-1938:

PRECIPITATION AT LOGAN, UTAH

Month	Precipitation 1937	Precipitation 1938	Departure from Normal 1937	Departure from Normal 1938
March	1.64"	4.40"	-0.26"	+2.50"
April	3.35"	1.58"	+1.50"	-0.27"
May	1.81"	2.12"	-0.21"	+0.09"
June	0.49"	0.92"	-0.36"	+0.04"
July	1.78"	0.53"	+1.16"	-0.11"
August	.01"	0.18"	-0.68"	-0.57"
September	1.40"	0.15"	+0.16"	-1.05"
October	1.66"	3.26"	+0.10"	+1.52"

Heavy precipitation during the early spring of 1938 delayed pumping from the river by the small pumps in Cache county until May. Likewise, the gravity canals did not divert to their maximum capacity until the latter part of May. For this reason all of the water in the upper river was diverted to storage in Bear lake until near the middle of June and not until August 1 were the pumps on Bear lake put into operation.

SNOW SURVEYS

During the past few years the following agencies have co-operated in making snow surveys over the State of Utah: (1) Utah Agricultural Experiment Station, (2) Utah State Engineer, (3) United States Forest Service, (4) National Parks Service, (5) United States Weather Bureau, and (6) Division of Irrigation, Bureau of Agricultural Engineering.

The information obtained by these agencies from snow surveys with which to forecast resulting runoff are of great value to the water users in planning their season's crops. The first tangible benefits resulting from snow surveying on this system were evident in 1931.

Six snow stations are maintained in connection with the Lower Bear river system. The number, name, location, and elevation of these stations are as follows:

NUMBER	NAME	LOCATION BY SEC.	T. & R.*		ELEVATION
1-A	Emigrant Summit (Idaho)		-		7700
9	Garden City Summit (Utah)	34	14N	4E	8200
10	Head of Bear river (Utah)	15	2N	10E	8600
10-A	Goodman ranch (Utah)	19	3N	10E	7900
12	Monte Cristo ranger station (Utah)	3	8N	4E	9000
28	Lost lake (Utah)	4-5	2S	9E	9900

* - Salt Lake Base and Meridian.

From measurements of snow cover obtained at the courses and listed in the foregoing table, forecasts have been made on April 1 of each year of the probable runoff. These have been reasonably close to the actual resulting runoff and have thus been helpful in properly estimating the probable amount of available water for power and for irrigation. The forecast of April 1, 1938 showed a probable rise in water level at Bear lake of 2.0 feet and a yield of 120,000 to 130,000 acre-feet. The actual rise in the lake level was 2.7 feet with a yield of 178,000 acre-feet. In the future the results of these forecasts should be given closer attention by water users.

POWER PLANTS

Only one power plant is operated within the Lower Bear river system in Utah - the Cutler plant of the Utah Power and Light Company. This plant operates under a head of 124 ft., uses a maximum of 1500 second-feet, and has a maximum capacity of 41,500 H.P. In order to conserve water this plant is not operated during the irrigation season.

WATER RIGHTS

Water distribution is made under both "use rights" and "decreed rights." Table XIV lists all users, showing decreed and use rights together with the amount of each. The decreed rights are from the decree of United States Court of eastern Idaho, Hon. F. S. Dietrich, Judge, filed July 14, 1920; and decree of First Judicial District Court of Utah, Hon. James H. Kimball, filed February 21, 1922. The natural flow of the river is not sufficient during most years to supply all existing rights; however, with judicious use of Bear Lake storage, both decreed and nondecreed rights may be satisfied. Gravity users (Utah-Idaho Sugar Company canals) have contracts with the Utah Power and Light Company to furnish them with storage water in excess of natural rights. The pump users also have contracts with the Power Company for power to pump water, and they, too, use storage water when the natural flow is deficient.

A summary of the amount of water used between the Weston bridge and the Utah-Idaho Sugar Company canals diverting at the Cutler dam is given in Table V. The daily discharge of Cub river (Lewiston-Bear Lake pumps) is given in Table X.

Due to the fact that there was no Water Commissioner during 1938 and that there was a sufficient quantity of water to satisfy all rights, no restrictions were made as to the use of the water. Notwithstanding these conditions there was no appreciable gain in the amount of water used in Utah above the Cutler reservoir. Several of the small pumps continued pumping well into October, yet with this prolonged pumping period an increase of only 114 acre-feet of water was used over the amount pumped in 1937. There was an increase of 6400 acre-feet used by gravity

canals of the Utah-Idaho Sugar Company, Box Elder county. The amount of water wasted, if any, is unknown. On September 1 and 2 the author carefully covered the district and no waste of water was noted.

USE OF WATER

The following table shows the average acre-feet per acre use of water per annum in Cache and Box Elder counties:

YEAR	CACHE COUNTY		BOX ELDER COUNTY
	ACRE-FEET PER ACRE		
	Small Pumps	Cub River Pump	Utah-Idaho Sugar Co. Canals
1927	1.61	.75	4.18
1928	1.61	.85	4.21
1929	1.61*	.80	3.67
1930	1.61*	.99	3.81
1931	1.61*	1.13	4.17
1932	1.61*	.82	4.04
1933	1.61*	.96	4.18
1934	1.28	1.36	3.16
1935	1.25	.76	3.29
1936	1.17	.69	3.79
1937	1.18	.74	3.70
1938	1.21	.69	3.82

* Estimated by Collins Cannon, 1936 Report.

From the above comparative table it is evident that the pump users demand and use much less water to mature their crops than do the gravity users.

Water Commissioner Collins T. Cannon, in his report for 1935, discusses the use of water in Box Elder county and expresses the opinion that "if an assured supply amounting to 2.9 acre-feet at the diversion or 2.4 acre-feet at the farmers head gates were available, normal crop procedure could be followed." If a practice along the lines of Mr. Cannon's suggestion had been followed, an appreciable saving in storage would have resulted. During a year such as 1938, this factor, perhaps, loses some of its importance; but during a period of low runoff, the possible saving by a more conservative use of water would be of great importance.

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TABLE I

IRRIGATION PUMPS ON LOWER BEAR RIVER

SHOWING KILOWATT HOURS CONSUMED FOR 1937 SEASON

Irrigator	Meter No.	May	June	July	August	September	October	Total
M.J. & H.W. Ballard	3431		4029	5269	4881	3845	811	18,835
Benson Bear Lake Pump	6345 E		6060	13120	16620	18000	200	54,000
Clarence (Joseph) Buck	2562			4145	1232	58		5,435
Cronquist & Baugh	3432-876		612	4061	2401	442	20	7,536
W.D. & D. Goodwin	7307			6724	3394	2525	230	12,873
Griffiths Pump	7936		2147	2899	2837	2874		10,757
Hill Irrigation Co.	2542 E		11135	6163	10873	4587	289	33,046
Ballard & Munk	10491-7303		5076	8660	9070	9470	230	32,506
Jorgensen & Thain	3291 E		4990	12410	10000	4440		31,840
King Irrigation Co.	10494		5712	9517	9200	9088	820	34,337
Abraham Smith Pump	3813 E		851	6225	6179	6289		19,544
Jonathan Smith	7308		10840	7020	7810	5780	3290	34,740
Smithfield West Bench	9065		2463	6158	12112	16011		36,744
Spring & Woolford	4092 E		1458	2162	1917	1592		7,129
W. H. Thain #1	3860 E			1197	1571	1045		3,813
W. H. Thain #2	4087 E			3759	3804	3672		11,235
Van Dyke c/o Lower & Goodwin	10495				4664	1299	1437	7,400
West Cache Canal Co.	5950-5706			4586				4,586
Wood Irrigation Co.	6043 E		10493	10289	10329	8276	4660	44,047
TOTAL			65866	114364	118894	99292	11987	410,403
Cub River Irrigation Co.	10641	Demand Meter		1215.8	1183.2	1142.3	- H.P. Demand	

Furnished by Utah Power & Light Company

TABLE II

IRRIGATION PUMPS ON LOWER BEAR RIVER

SHOWING KILOWATT HOURS CONSUMED FOR 1938 SEASON

Irrigator	Meter No.	May	June	July	August	September	October	Total
M.J. & H.W. Ballard	3431 & 3432		4759	3887	4993	3095	945	17,679
Ballard & Munk	7303		8370	7140	10800	10420	2990	39,720
Benson Bear Lake Pump	6345 E		7510	7550	19860	15120	5350	55,390
Clarence (Joseph) Buck	- Did not operate this season -							
Cronquist & Baugh	876 D		1651	2190	2290	1000	580	7,711
W.D. & D. Goodwin	7307 E		2781	1882	1983	1269	1275	9,190
Griffiths Pump	7936		2359	2991	4443	3790	668	14,251
Hill Irrigation Co.	2542 E		10477	3633	9890	6499		30,499
King Irrigation	10494		3997	9624	10206	7157	5093	36,077
Munk & Jorgenson	5706- 3291		2030	4610	3490			10,130
Abraham Smith	3813 E		3629	3768	6903	3723	1853	19,376
Jonathan Smith	7308 E	1220	8890	7480	9720	6070	3280	36,660
Smithfield West Cache	9065		6838	6838	12033	3872		29,581
Spring & Woolford	- Did not operate this season -							
Thain & Hoffman	5047 E		7840	8140	10600	7120		33,700
W.H. Thain #1	3860 E		672	890	2059	1290	460	5,371
W. H. Thain #2	4087 E		1787	2312	4698	592		9,389
Van Dyke c/o Lower & Goodwin	10495 -9039		1302	1410	1693	1038	1132	6,575
West Cache Canal Co.	5706 E		12096	15018				27,114
Wood Irrigation Co.	6043 E		8865	6510	10510	6349	2360	34,594
TOTAL		1220	95853	95873	126171	78404	25986	423,507
Cub River Irrigation Co.	10641 Demand meter			775.89	1199.73	1232.3 - H.P. Demand		

Furnished by Utah Power and Light Company

TABLE III

STATE OF UTAH

OFFICE OF STATE ENGINEER

NAME OF CANAL OR DIVERSION	KIND AND NATURE OF DIVERSION DAM	HEAD GATE	MEASURING DEVICE	RECOMMENDATIONS
West Canal	Concrete Arch	Concrete steel slide gate	Automatic continuous recorder.	
East Canal	Ditto	Ditto	Ditto	
Lewiston B. L. Pumps	4-25 sec. ft.	pumps	none	Needs change in diversion canal or diversion dam.
Bensen, B. L.	40 H. P. Motor & Pump		None	
W. H. Thain No. 1.	10 "	" "	"	
W. H. Thain No. 2	10 "	" "	"	
H. Cronquist	10 "	" "	"	
A. Smith	15 "	" "	"	
H. W. Ballard	10 "	" "	"	
Ballard & Munk Thain-Hoffman)	25 "	" "	"	
Jorgensen-Munk)	35 "	" "	"	
King Irrigation Co.	25 "	" "	"	
T. L. Griffiths	15 "	" "	"	
J. Smith	20 "	" "	"	
Van Dyke-Simmons & Lower	15 "	" "	"	
Wood Irrigation Co.	20 "	" "	"	
Joseph Buck	20 "	" "	"	
Smithfield, W. B.	50 "	" "	"	
Hill Irrigatio. Co.	25 "	" "	"	
West Cache Canal Co.	50 "	" "	"	

TABLE IV
BEAR RIVER INCREASE FROM WESTON BRIDGE, IDAHO
TO CUTLER DAM, UTAH
- 1938 -

Diversions	May	June	July	Aug.	Sept.	Oct.
Lewiston P.L. Pumps		331	2765	4562	2231	0
Small Pumps	14	1055	1077	1582	1018	343
East Canal	3840	8130	5840	8520	7000	1698
West Canal	19023	36261	27528	37251	29901	13617
Cutler Reservoir Increase	2484	491			824	171
Bear River below Cutler Dam	172370	32870	19837	1092	5728	
TOTALS	197731	79138	57047	53007	46702	
INPUT TO RIVER						
Bear River at Weston	62070	23060	19750	25893	22041	
Cutler Reservoir Draw Down			1445	824		
TOTALS	62070	23060	21195	26722	22041	
Increase to Bear River (Total Diversion and Reservoir increase minus input to river)	135661	56078	35852	26285	24661	

Note: - All quantities in acre-feet.

TABLE V
SUMMARY OF WATER FROM BEAR RIVER
BETWEEN WESTON BRIDGE AND CUTLER DAM
- 1938 -

Name of User	Acres	May	June	July	Aug.	Sept.	Oct.	1938 Totals	1937 Totals	Acre-Feet Per Acre
Benson B.L.	785		161	162	435	323	114	1195	1085	1.52
W. H. Thain #1	125		12	16	37	23	8	96	77	.60
H. Cronquist	276		46	61	64	28	16	215	208	.77
A. Smith	204		50	52	94	51	26	273	268	1.33
H. W. Ballard	163		47	39	50	31	9	176	182	1.69
Ballard & Munk	168		74	63	96	93	27	353	162	2.10
W. H. Thain #2	98		25	33	66	8	0	132	166	1.35
Thain - Hoffman) Jorgensen - Munk)	330		111	115	150	101	0	477	450	1.45
Spring & Woolford	30		0	0	0	0	0	0	70	0
King Irrigation Co.	480		56	135	143	100	71	505	533	1.05
T. L. Griffiths	102		30	39	58	49	9	185	146	1.81
J. Smith	159	14	107	90	117	73	40	441	388	2.69
Van Dyke & J. C. Lower	74		13	14	17	10	11	65	73	.88
Wood Irrigation Co.	201		45	33	54	32	12	176	314	.88
Joseph Buck	65		0	0	0	0	0	0	53	0
Smithfield W.B.	521		49	49	87	21	0	206	266	.39
Hill Irrigation Co.	245		120	41	114	75	0	350	381	1.42
West Cache Canal Co.			109	135	0	0	0	244	40	
TOTAL - SMALL PUMPS	4176	14	1055	1077	1582	1018	343	5089	4975	1.21
Lewiston Bear Lake Pumps	14221	0	331	2765	4562	2231	0	9889	10718	.69
Utah-Idaho Sugar Co.										
West Canal		19023	36261	27528	37251	29901	13617	163581	157796	
East Canal		3840	8130	5840	8520	7000	1698	35028	34410	
TOTALS	52000	22863	44391	33368	45771	36901	15315	198609	192206	3.82
GRAND TOTALS	70397	22867	45799	37210	51915	40150	15658	213587	207899	3.03

Note: - All quantities in acre-feet.

TABLE VI

STATE OF UTAH
OFFICE OF STATE ENGINEER

Daily Discharge in Second Feet of Bear River

at Heston Bridge for 193_8

Day	April	May	June	July	August	Sept.
1		1600	860	227	362	326
2		1560	715	240	405	256
3		1464	643	328	340	266
4		1257	476	448	440	271
5		1260	403	402	486	265
6		1160	430	357	348	266
7		1050	620	350	405	304
8		878	398	377	258	336
9		893	395	304	402	447
10		1078	482	274	410	422
11		706	338	310	420	271
12		753	340	265	470	262
13		760	379	252	455	500
14		601	405	405	385	642
15		691	341	422	314	498
16		664	310	275	324	405
17		833	400	253	373	263
18		1078	334	262	287	360
19		1312	314	515	362	560
20		1440	340	381	383	304
21	1540	1216	338	420	430	268
22	1500	1120	292	352	260	460
23	1520	921	255	232	328	492
24	1564	819	222	236	602	435
25	1592	802	200	223	718	515
26	1608	854	244	228	667	265
27	1600	1019	308	284	673	345
28	1548	987	340	370	510	476
29	1492	858	260	340	430	270
30	1408	833	244	355	435	362
31		826		270	375	
Mean Sec. Ft.	15372	31293	11626	9957	13057	11112
Total Ac Ft.	30490	62070	23060	19750	25898	22041

TOTAL FOR 1938 --- 183309 ACRE FEET

STATE OF UTAH
OFFICE OF STATE ENGINEER

Daily Discharge in Second Feet of EAST (HAMMOND) CANAL

at BELOW CUTLER RESERVOIR for 193

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.
1		29	139	0	139	127	98	12
2		27	140	0	139	128	98	12
3		27	137	0	139	128	101	12
4		27	137	0	140	128	105	12
5		29	139	0	141	128	99	10
6		30	139	0	143	127	92	9
7		29	138	8	140	128	94	8
8		29	139	30	140	129	88	8
9		18	140	46	140	101	70	8
10		0	140	58	140	105	56	7
11		29	139	75	140	115	45	7
12		48	139	92	139	126	40	5
13	0	69	139	118	139	125	42	3
14		68	139	121	140	122	44	0
15		69	139	128	140	114	45	
16		73	141	137	139	114	29	
17		62	141	136	139	113	22	
18		48	140	140	140	112	22	
19		38	140	147	140	112	22	
20		53	138	148	139	114	20	
21		64	138	148	139	114	16	
22		56	138	147	138	114	11	0
23		63	138	142	139	114	10	
24		87	139	140	139	114	10	
25		104	138	146	140	114	11	
26		119	139	143	140	115	11	
27		128	139	142	140	115	12	
28	28	128	139	136	140	114	12	
29	27	128	138	139	134	113	12	
30	39	127	69	138	126	107	12	
31		130		137	124		12	
Mean Sec. Ft.	3.1	62.5	136.6	94.9	139	118	44	3.8
Total Ac. Ft.	186	3840	8130	5840	8520	7000	2698	224
Total cfs	94	1936	4098	2942	4295	3530	1361	113

TOTAL FOR 35438 ACRE FEET

TABLE VIII

STATE OF UTAH
OFFICE OF STATE ENGINEER

Daily Discharge in Second Feet of WEST WHEELON CANAL

at _____ for 1938 193

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.
1		116	614	136	573	594	442	93
2		95	626	226	577	585	432	90
3		91	654	159	577	569	430	86
4		90	656	159	577	547	423	86
5		91	656	157	575	520	407	72
6		94	654	155	573	516	399	63
7		105	654	156	587	513	389	62
8		105	650	190	618	513	358	62
9		109	652	237	606	516	301	62
10		140	650	237	590	520	267	62
11		183	652	262	598	522	270	62
12		118	650	352	616	515	270	62
13		258	646	491	656	515	260	62
14		370	610	500	674	518	257	62
15	0	442	608	528	656	522	258	62
16		407	575	583	620	507	253	62
17		300	568	618	620	489	159	62
18		249	581	650	620	470	93	57
19		257	606	684	620	466	93	46
20		290	626	690	620	480	93	49
21		361	632	690	618	456	93	55
22		386	644	688	620	452	93	54
23		442	648	660	620	461	93	
24		506	638	608	618	471	94	
25		522	622	606	600	477	94	
26		522	626	608	594	488	91	50
27		549	622	588	596	482	90	
28	6	581	612	568	592	468	91	
29	66	602	598	569	590	468	91	
30	109	604	56	566	592	459	90	
31		608		560	592		93	
Total Sec. Ft.	181	9593	18286	13881	18785	15079	6867	1833
Total Ac. Ft.	358	19023	36261	27528	37251	29901	13617	2643
Mean	6.0	309	609	448	606	502	221	61

TOTAL FOR _____ ACRE FEET

TABLE IX

STATE OF UTAH

OFFICE OF STATE ENGINEER

Daily Discharge in Second Feet of BEAR RIVER

at COLLINSTON for 193

Day	April	May	June	July	Aug.	Sept.
1	1250	4440	1950	714	18	16
2	645	4350	2070	397	18	16
3	205	4240	1830	633	18	16
4	1280	3930	1670	1630	18	16
5	2000	4000	608	903	18	16
6	1800	3630	735	1410	18	16
7	1760	3480	954	1310	18	16
8	1580	2830	1120	886	18	20
9	967	2560	570	750	18	20
10	666	2710	730	726	18	20
11	1940	2140	773	114	18	25
12	2170	2430	389	206	18	25
13	2760	1870	551	303	18	25
14	2100	1500	678	18	18	25
15	2220	582	398	16	18	27
16	3310	1040	49	18	16	27
17	3370	1930	18	18	16	27
18	3400	3270	18	18	16	30
19	3400	3860	18	18	16	30
20	3425	4040	16	18	16	30
21	3340	4290	16	18	16	30
22	3410	3860	16	18	25	30
23	3420	2930	251	18	18	30
24	3320	1780	271	18	18	30
25	3680	2300	269	18	18	33
26	4360	2140	16	18	18	33
27	4490	2190	16	18	18	537
28	4800	2390	16	18	18	781
29	4580	1940	16	18	18	357
30	4420	2540	545	18	18	585
31		1730		18	16	
Mean Sec. Ft.	2339	2804	549	335	18	96
Total Ac. Ft.	158770	172370	32870	19837	1092	5728
Total cfs	80066	86922	16577	10004	551	2889

TOTAL FOR 390667 ACRE FEET

TABLE X

STATE OF UTAH
OFFICE OF STATE ENGINEER

Daily Discharge in Second Feet of Cub River Irrigation Co. Pumps

at _____ for _____ 1938

Day	April	May	June	July	August	Sept.
1				25	75	75
2				9	75	75
3				0	75	75
4				0	75	75
5				0	75	75
6				0	75	75
7				0	50	75
8				0	75	75
9				0	75	75
10				0	75	75
11				0	75	75
12				13	75	75
13				36	75	75
14				50	75	75
15				61	75	75
16				75	75	
17				75	75	
18				75	75	
19				75	75	
20				75	75	
21				75	75	
22				75	75	
23				75	75	
24			17	75	75	
25			25	75	75	
26			25	75	75	
27			25	75	75	
28			25	75	75	
29			25	75	75	
30			25	75	75	
31				75	75	
Mean Sec. Ft.			167	1394	2300	1125
Total Ac. Ft.			331	2765	4562	2231

• TOTAL FOR 1938 ---- 9889 ACRE FEET

TABLE XI

Salt Lake City, Utah
December 30, 1938

BEAR LAKE ELEVATIONS

	1937	1938
January 1	5907.7	5910.5
February 1	07.8	10.6
March 1	08.0	10.8
April 1	08.6	11.5
May 1	10.2	12.8
June 1	12.0	14.6
July 1	12.2	15.2
August 1	11.9	15.0
September 1	10.9	14.3
October 1	10.2	13.9
November 1	10.2	13.6
December 1	10.3	13.3

Salt Lake City, Utah
December 30, 1938

TABLE XII

CUTLER RESERVOIR ELEVATIONS

1938

Date	April	May	June	July	Aug.	Sept.	Oct.
1	4402.3	4400.9	4403.2	4403.2	4402.3	4401.2	4402.0
2	03.1	00.9	03.0	03.9	02.2	01.2	02.0
3	03.8	00.8	02.8	04.0	02.3	01.0	01.7
4	03.8	00.9	02.6	03.8	02.2	00.9	01.6
5	03.5	00.6	03.0	04.0	02.2	00.8	01.7
6	03.7	00.8	03.0	03.9	02.2	00.6	01.5
7	03.5	00.6	03.0	03.8	02.2	00.5	01.6
8	03.4	01.3	02.8	03.8	02.0	00.4	01.9
9	03.5	01.4	03.8	03.8	01.8	00.6	02.3
10	03.9	01.0	02.9	03.8	01.8	00.9	02.4
11	03.5	01.1	02.6	03.9	01.8	01.0	02.4
12	03.3	00.8	02.8	04.0	01.8	01.0	02.4
13	02.9	00.5	02.7	03.8	01.7	01.1	02.4
14	03.1	00.3	02.7	03.7	01.6	01.5	02.6
15	03.0	02.1	02.9	03.8	01.5	01.8	02.8
16	02.6	02.7	03.2	03.9	01.3	02.0	03.0
17	02.1	02.6	03.4	03.9	01.1	02.1	03.0
18	01.6	02.7	03.7	03.7	01.0	02.1	03.2
19	01.2	02.6	03.8	03.6	00.8	02.3	03.3
20	01.1	02.2	03.9	03.7	00.6	02.5	03.5
21	01.4	01.9	04.0	03.6	00.5	02.6	03.6
22	01.8	01.7	04.1	03.5	4400.2	02.6	03.4
23	02.2	02.5	04.1	03.3	4399.7	02.8	03.3
24	02.9	02.5	04.0	03.2	99.3	03.0	02.9
25	03.0	02.5	03.9	03.0	4399.2	03.1	02.5
26	03.0	02.5	03.8	02.9	4400.4	03.2	02.3
27	02.9	02.6	03.9	02.6	00.8	03.0	02.2
28	02.3	02.4	03.8	02.5	01.1	02.7	02.3
29	01.7	02.3	03.8	02.6	01.2	02.7	02.4
30	01.3	02.6	03.8	02.5	01.2	02.4	02.8
31		03.4		02.4	01.2		02.8

TABLE XIII

STATE OF UTAH

OFFICE OF STATE ENGINEER

ELEVATIONS, AREA, AND CAPACITY OF BEAR LAKE.

ELEVATIONS	AREA—ACRES	ACRE-FEET AVAILABLE ABOVE ELEVATION 5,902.0
From 5,902 to 5,903	58,200	59,000
03 to 04	59,800	119,000
04 to 05	60,500	179,500
05 to 06	61,200	240,500
06 to 07	61,900	302,500
07 to 08	62,600	365,000
08 to 09	63,300	428,500
09 to 10	63,900	492,500
5,910 to 11	64,400	556,500
11 to 12	65,100	622,000
12 to 13	65,700	687,500
13 to 14	66,400	754,000
14 to 15	67,000	821,000
15 to 16	67,600	888,500
16 to 17	68,300	957,000
17 to 18	68,900	1,026,000
18 to 19	69,400	1,095,000
19 to 20	69,700	1,165,000
5,920 to 21	70,000	1,235,000
21 to 22	70,100	1,305,000
22 to 23	70,300	1,375,500
23 to 23.65	70,500	1,420,000

TABLE OF CAPACITIES OF MUD LAKE

ELEVATIONS	ACRE-FEET
From 5,920 to 5,921	6,000
21 to 22	7,500
22 to 23	9,000
23 to 24	10,700

TABLE OF CAPACITIES OF CUTLER RESERVOIR

ELEVATIONS	ACRE-FEET
From 4,399 to 4,400	1,786
4,400 to 01	2,246
01 to 02	2,978
02 to 03	4,402
03 to 04	5,651

TABLE XIV

STATE OF UTAH

OFFICE OF STATE ENGINEER

BEAR RIVER WATER RIGHTS BETWEEN WESTON BRIDGE, IDAHO AND CUTLER DAM, UTAH

DECREED RIGHTS

NUMBER		DATE OF PRIORITY	ACRES	AMT. IN AC.-FT.	REMARKS
2	Lewiston Bear Lake Irrigation Co.	Dec. 11, 1914	10,000	100.0	
4	W. D. Goodwin	May 1, 1894	140	.5	
5-9	Van Dyke-Simmons (& J. C. Lower)	May 1, 1918	200	3.0	
10	Hill Irrigation Co.	May 15, 1920	310	4.0	
11	Wood Irrigation Co.	June 12, 1920	124	2.0	
14	Smithfield W. B.	June 1, 1919	75	5.0	
20-22	John Smith	May 1, 1917	270	3.0	
23-26	Ballard & Munk	May 1, 1917	300	4.0	
27	Bensen B. L.	May 1, 1917	700	7.0	
34	Olaf Cronquist (Heber Cronquist)	May 1, 1918	480	6.0	
24	Utah Power & Light	Dec. 1, 1903		270.0	To divert from Bear River via West and East canals, and use for power and return to river. Wheelon power plant.
24	Ditto	Dec. 1, 1906		135.0	Ditto
24	Ditto	Dec. 1, 1908		135.0	Ditto
24	Ditto	Dec. 2, 1912		500.0	Ditto

NONDECREED USERS

J. C. Lower	-	20	1.8	Has right in Van Dyke-Simmons pump.
Joseph Buck	-	65	2.0	
King Irrigation Co.	-	480	3.7	
T. L. Griffiths	-	102	1.7	Has decreed right in Hopkins' slough; part water from there and balance from Bear River
H. W. Ballard	-	163	2.0	
W. H. Thain No. 1	-	125	1.8	Enjoined from using waters of Bear River
W. H. Thain No. 2	-	98	1.6	Ditto (Kimball decree)
A. Smith	-	185	2.3	Ditto
Ed. Smith (Spring & Wolford)	-	30	.8	
Jorgensen & Munk	-	150	2.1	

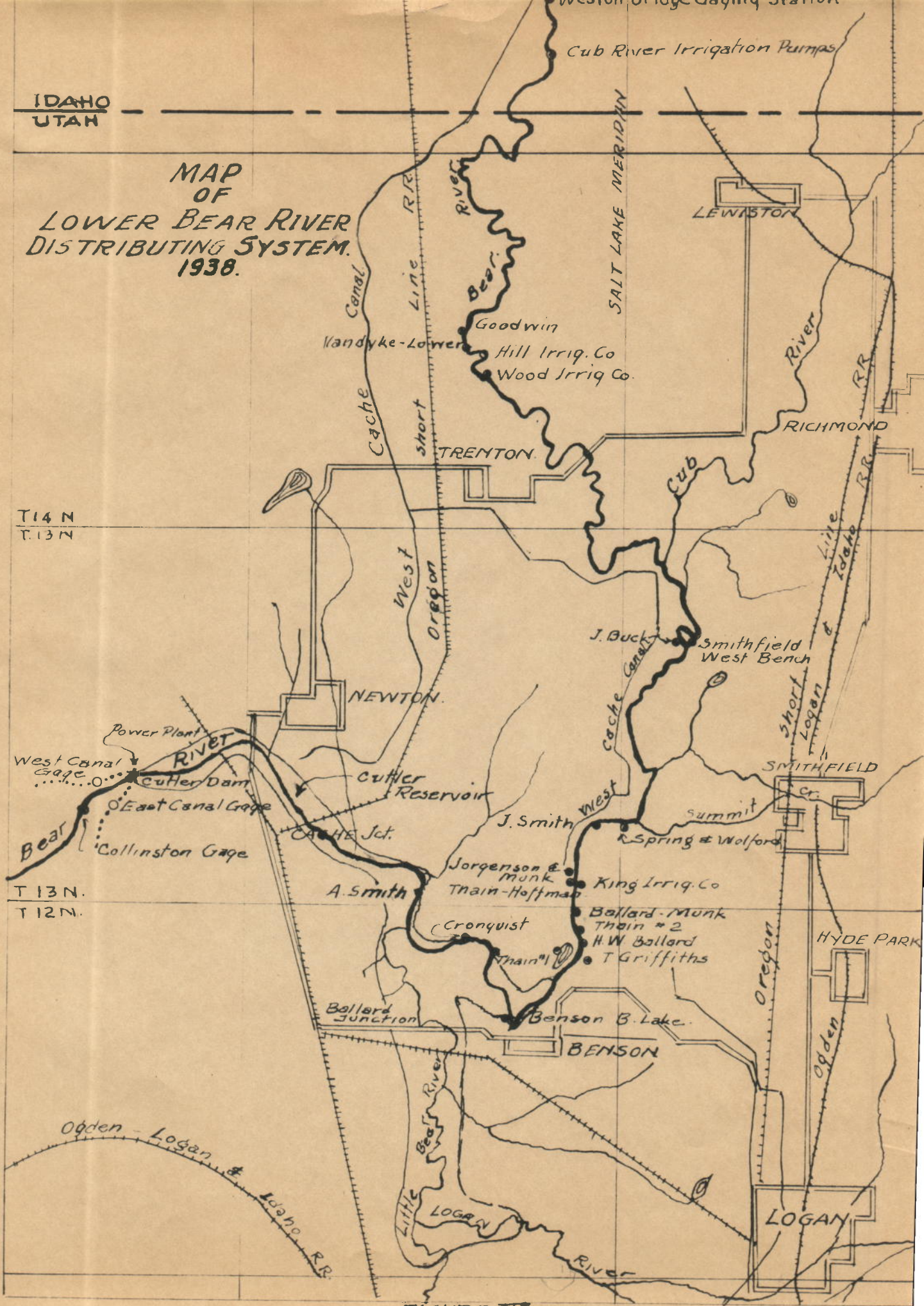
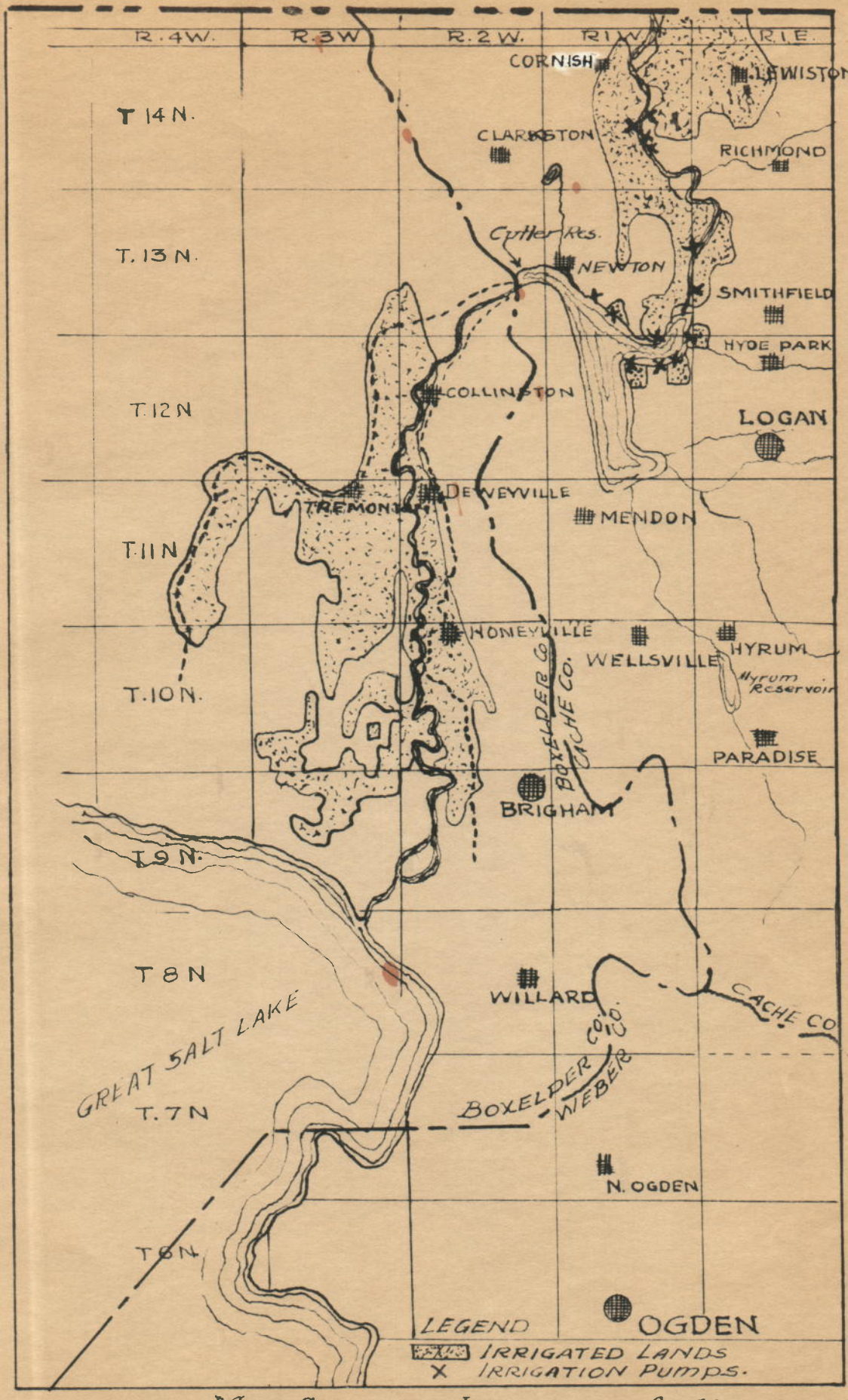

Weston Bridge Gaging Station
Cub River Irrigation Pumps
IDAHO
UTAH
MAP
OF
LOWER BEAR RIVER
DISTRIBUTING SYSTEM.
1938.
SALT LAKE MERIDIAN
LEWISTON
Bear River
Cache Canal
Line
R.R.
Goodwin
Vandyke-Lower
Hill Irrig. Co
Wood Irrig Co.
River
R.R.
RICHMOND
Cache
short
TRENTON
Cub
T14 N
T.13 N
West
Oregon
Line
Idaho
R.R.
J. Buck
Smithfield
West Bench
NEWTON
Cache Canal
Short
Logan &
Power Plant
West Canal
Gage
RIVER
Cutler Dam
Cutler
Reservoir
SMITHFIELD
Cr.
East Canal Gage
Bear
CACHE Jct.
J. Smith
West
Summit
R. Spring & Wolford
Collinston Gage
Jorgenson &
Munk
Thain-Hoffman
King Irrig. Co
T 13 N.
T 12 N.
A. Smith
Ballard-Munk
Thain #2
Cronquist
H.W. Ballard
Thain #1
T. Griffiths
HYDE PARK
Oregon
Ballard
Junction
Benson B. Lake
BENSON
Ogden
Bear River
Ogden - Logan & Wano R.R.
Little
LOGAN
LOGAN
River

FIGURE III



MAP SHOWING IRRIGATED AREAS
LOWER BEAR RIVER.
FIGURE II

STATE OF UTAH
OFFICE OF STATE ENGINEER

TABLE II

Daily Discharge in Second Feet of BEAR RIVER

at HESTON BRIDGE (IDAHO) for 1937

Day					May	June	July	August	Sept.	Oct.		
1					1270	330	385	480	780			
2					1100	380	380	500	978			
3					1130	370	510	410	745			
4					1295	510	640	385	710			
5					1430	480	575	380	710			
6					1110	395	440	380	607			
7					1380	440	380	385	517			
8					1365	430	640	450	540			
9					1600	410	385	520	573			
10					1360	440	310	380	685			
11					1185	410	420	470	640			
12					1300	330	400	380	593			
13					1470	410	410	370	501			
14					1120	330	460	340	544			
15					1430	300	480	450	590			
16					1180	280	480	510	462			
17					1110	330	330	515	462			
18					1385	240	300	470	425			
19					1300	265	280	510	480			
20					960	245	300	510	390			
21					980	245	310	515	573			
22					970	230	280	570	500			
23					960	180	335	565	390			
24					1180	265	310	580	385			
25					960	190	385	600	510			
26					940	180	510	673	340			
27					780	135	375	462	390			
28					380	240	370	450	260			
29					330	220	500	436	230			
30					480	300	410	573	220			
31					460		500	544	230			
Mean Sec. Ft.					34160	9760	13330	14813	18907			
Total Ac. Ft.					68320	19520	26660	29626	30614			

TOTAL FOR 174,740 ACRE FEET

STATE OF UTAH
OFFICE OF STATE ENGINEER

TABLE III

Daily Discharge in Second Feet of LEWISTON NEAR LAKE PUMPS

at NEAR LEWISTON (UTAH) for 193[illegible]

Day						June	July	August	Sept.			
1							48	48	72			
2							48	48	72			
3							64	48	72			
4							72	48	72			
5							72	48	72			
6							72	48	72			
7							72	48	72			
8							72	48	72			
9							72	48	72			
10							72	48	72			
11							72	48	72			
12							72	56	72			
13							72	72	72			
14							72	72	72			
15							65	72	72			
16							48	72	72			
17							48	72	72			
18							48	72	72			
19							48	72	60			
20							53	72	0			
21							72	72				
22							72	66				
23							72	72				
24							72	72				
25							72	72				
26							72	72				
27							72	72				
28							72	72				
29							72	72				
30						28	71	72				
31							49	72				
Mean Sec. Ft.						28	2029	1946	1856			
Total Ac. Ft.						56	4058	3892	3712			

TOTAL FOR 10,718 ACRE FEET

STATE OF UTAH
OFFICE OF STATE ENGINEER

TABLE IV

Daily Discharge in Second Feet of WEST CANAL

at WELLON for 193[illegible]

Day												
					May	June	July	August	Sept.	Oct.		
1						300	646	385	388	383		
2						382	650	416	361	344		
3						400	650	443	361	386		
4						400	650	464	362	365		
5					45	424	650	484	362	387		
6					100	450	650	501	389	314		
7					100	470	600	527	389	313		
8					100	510	388	576	368	292		
9					100	510	380	574	364	295		
10					100	510	380	567	364	294		
11					134	510	380	567	340	288		
12					100	510	380	567	340	281		
13					105	510	380	576	335	285		
14					215	506	380	580	389	257		
15					262	490	380	580	314	215		
16					335	490	380	581	306	194		
17					365	490	371	602	409	257		
18					409	512	400	603	426	167		
19					465	540	412	586	400	165		
20					502	540	406	586	470	147		
21					575	540	586	588	486	134		
22					594	540	600	588	480	135		
23					600	540	550	600	432	128		
24					600	557	500	598	404	118		
25					600	575	600	600	385	115		
26					616	609	600	600	364	115		
27					625	640	588	600	358	116		
28					640	640	585	586	355	116		
29					640	640	540	586	358	116		
30					586	640	511	580	358	116		
31					580		497	530		116		
Mean Sec. Ft.					9912	15565	14961	17280	14082	6754		
Total Ac. Ft.					19084	30730	29922	34640	29162	13518		

TOTAL FOR 157,706 ACRE FEET

STATE OF UTAH
OFFICE OF STATE ENGINEER

TABLE V

Daily Discharge in Second Feet of EAST (HAMMOND) CANAL

at [illegible] for 193[illegible]

Day					May	June	July	August	Sept.	Oct.		
1					75	75	140	136	122	69		
2						75	130	136	124	72		
3					7	75	150	134	122	79		
4					10	75	150	134	112	81		
5					36	75	150	136	114	71		
6					50	75	150	137	124	66		
7					50	[illegible]	150	136	125	69		
8					50	96	45	136	126	57		
9					50	107	28	137	122	49		
10					50	110	30	126	118	52		
11					50	110	30	126	115	52		
12					50	110	30	130	112	52		
13					60	100	30	130	106	52		
14					65	90	30	137	108	49		
15					65	80	46	136	109	35		
16					65	86	60	136	109	26		
17					76	95	82	136	109	22		
18					106	95	38	137	109	0		
19					110	95	2	137	111	0		
20					110	105	62	138	110	0		
21					122	130	115	136	105	0		
22					125	135	145	134	99	0		
23					130	135	150	134	80	0		
24					130	141	150	134	68	25		
25					141	145	150	136	68	19		
26					145	145	150	131	68	25		
27					145	145	150	126	68	25		
28					148	145	138	136	66	22		
29					150	145	130	126	65	25		
30					127	145	138	136	68	25		
31					75		118	136		25		
Mean Sec. Ft.					2514	3908	3134	4167	3089	1122		
Total Ac. Ft.					5028	6616	6268	8334	6118	2244		

TOTAL FOR 34,408 ACRE FEET

STATE OF UTAH

OFFICE OF STATE ENGINEER

TABLE VI

Daily Discharge in Second Feet of BEAR RIVER

at BELOW CUTLER DAM for 193?

Day					May	June	July	August	Sept.			
1					1786	1786	14	14	14			
2					907	2284	14	14	14			
3					1839	1660	14	14	14			
4					2068	1300	14	14	14			
5					2584	1215	14	14	14			
6					2306	1454	14	14	14			
7					2613	1515	14	14	14			
8					3332	685	14	14	14			
9					3735	840	14	14	14			
10					4228	902	14	14	14			
11					4187	980	14	14	14			
12					4265	673	14	14	14			
13					4448	810	14	14	14			
14					3884	804	14	14	14			
15					2811	713	575	14	14			
16					3140	830	1227	14	14			
17					3210	175	379	14	14			
18					2729	70	342	14	14			
19					2586	14	19	14	14			
20					2571	106	38	14	14			
21					2254	84	14	14	14			
22					2293	146	14	14	14			
23					1812	29	14	14	14			
24					1603	14	14	14	14			
25					1620	14	14	14	14			
26					1675	14	33	14	14			
27					1603	14	14	14	14			
28					1226	14	14	14	14			
29					555	14	14	14	115			
30					499	14	14	14	692			
31					1094		14	14				
Mean Sec. Ft.					74692	18773	2949	434	1399			
Total Ac. Ft.					149384	37546	5898	868	2798			

TOTAL FOR 196,494 ACRE FEET

TABLE VII

BEAR RIVER INCREASE FROM WESTON BRIDGE, IDAHO

TO CUTLER DAM, UTAH

Diversions	May	June	July	August	September
Lewiston B. L. Pumps		56	3814	3698	2712
Small Pumps		1100	1407	1708	780
East Canal	5028	6418	6238	8534	6118
West Canal	19634	30730	29922	34640	29162
Cutler Reservoir Increase	12100		1080		12600
Bear River Below Cutler Dam	149384	37344	5928	868	2798
Totals	186536	79650	48419	49432	54150
Input to River					
Bear River at Weston	68830	19530	26660	29686	30614
Cutler Reservoir Drawdown		7980		6800	
Totals	68830	27070	26660	36486	30614
Increase to Bear River (Total diversions and Reservoir Increase minus Input to River)	118016	48780	21759	12946	23536

Note: All quantities in Acre Feet.

TABLE VIII

BEAR RIVER WATER RIGHTS BETWEEN WESTON BRIDGE, IDAHO AND CUTLER DAM, UTAH.

DECREED RIGHTS

No.	Name	Date of Priority	Acres	Amount in C.F.S.	Remarks & Explanations
2	Lewiston Bear Lake Irr. Co.	Dec.11,'14	10,000	100	
4	W. D. Goodwin	May 1,'94	140	.5	
8-9	Van Dyke-Simmons (&J.C.Lower)	May 1,'18	200	8.0	
10	Mill Irr. Co.	May 15'20	510	4.0	
11	Wood Irr. Co.	June 12'20	134	2.0	
14	Smithfield W. P.	June 1,'19	75	5.0	
20-22	John Smith	May 1,'17	270	5.0	
23-26	Ballard&Bank	May 1,'17	200	4.0	
27	Benson B. L.	May 1,'17	700	7.0	
34	Olaf Crenquist (Heber Crenquist)	May 1,'18	480	6.0	
24	Utah Power & Light Company	Dec.1,'08		270	To divert from Bear River via West and East Canals and use for Power and return to river. Wheelon Power Plant.
24	Ditto	Dec.1,'08		135	Ditto
24	Ditto	Dec.1,'08		135	Ditto
24	Ditto	Dec.8,'12		300	Ditto

NON DECREED USERS

Name	Acres	Amount in c.f.s	Remarks
J. G. Lower	80	1.6	Has right in Van Dyke Simmons Pump
Joseph Buck	65	2.0	
King Irrig. Co.	480	3.7	
T. L. Griffiths	102	1.7	Has decreed right in Hopkins slough; part water from there and balance from Bear River
H. W. Ballard	163	2.0	
W. H. Thain No. 1	125	1.8	Enjoined from using waters of Bear River (Kimball Decree)
W. H. Thain No. 2	98	1.6	Ditto
A. Smith	165	2.5	Ditto
Ed Smith (Spring & Wolford)	30	.8	
Jorgensen & Munk	130	2.1	

TABLE IX

Name of canal or diversion	Kind and Nature of Div. Dam	Headgate	Meas. Device	Recommendations
West Canal	Conc. Gravity Arch	Conc. Steel slide gate	Automatic continuous recorder	
East Canal	Ditto	Ditto	Ditto	
Lewiston B. L. Pumps	4 - 35 c.f.s. pumps		None	Needs change in diversion canal or diversion dam
Benson B. L.	40 H.P.	Meter & Pump	None	
Wm.H. Thain No. 1	10 "	" " "	"	
W. H. Thain No. 2	10 "	" " "	"	
H. Ormquist	10 "	" " "	"	
A. Smith	15 "	" " "	"	
H. W. Ballard	20 "	" " "	"	
Ballard & Munk	25 "	" " "	"	
Thain-Hoffman) Jorgenson-Munk)	35 "	" " "	"	
Spring & Welford	7.5 "	" " "	"	
King Irr. Co.	25 "	" " "	"	
T. L. Griffiths	15 "	" " "	"	
J. Smith	20 "	" " "	"	
Van Dyke Simmons & Lower	15 "	" " "	"	
Weed Irr. Co.	20 "	" " "	"	
Joseph Buck	20 "	" " "	"	
Smithfield W. B.	20 "	" " "	"	
Hill Irr. Co.	25 "	" " "	"	
West Cache Canal Co.	30 "	" " "	"	

TABLE X

ELEVATIONS, AREA, AND CAPACITY OF BEAR LAKE

ELEVATIONS	AREA-ACRES	ACRE FT. AVAILABLE ABOVE ELEV. 5902.0
FROM 5902 to 5903	58200	59000
03 to 04	59800	119000
04 to 05	60500	179250
05 to 06	61200	240500
06 to 07	61900	302800
07 to 08	62600	365000
08 to 09	63300	428500
09 to 10	63900	492200
5910 to 11	64400	556200
11 to 12	65100	621000
12 to 13	65700	687200
13 to 14	66400	754000
14 to 15	67000	821000
15 to 16	67600	888500
16 to 17	68300	957000
17 to 18	68900	1026000
18 to 19	69400	1095000
19 to 20	69700	1163000
5920 to 21	70000	1233000
21 to 22	70100	1303000
22 to 23	70300	1373500
23 to 23.65	70500	1443000

TABLE OF CAPACITIES OF MUD LAKE

	Acre Ft.
FROM 5920 to 5921	6000
21 to 22	7500
22 to 23	9000
23 to 24	10700

TABLE OF CAPACITIES OF CUTLER RESERVOIR

	Acre Ft.
From 4399 to 4400	1786
4400 to 01	3846
01 to 02	5978
02 to 03	4402
03 to 04	5651